

Appl. No. 10/594,784  
Response Dated September 22, 2008  
Reply to Office Action of April 22, 2008

**•• REMARKS/ARGUMENTS ••**

The Official Action of April 22, 2008 has been thoroughly studied. Accordingly, the following remarks are believed to be sufficient to place the application into condition for allowance.

Claims 1-8, 10 and 12 are pending in this application.

Claims 1-4, 7, 8, 10 and 12 stand rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,156,849 to Moriyama et al. in view of JP 61-171737 to Hiramatsu et al.

Claims 5 and 6 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Moriyama et al. in view of Hiramatsu et al. and U.S. Patent No. 3,989,665 to Hollingshead.

For the reasons set forth below, it is submitted that all of the pending claims are allowable over the prior art of record and therefore, the outstanding rejections of the claims should properly be withdrawn.

Favorable reconsideration by the Examiner is earnestly solicited.

The Examiner has relied upon Moriyama et al as disclosing:

...an acrylic elastomer composition, which comprises an acrylic elastomer obtained by copolymerization with 0.1 to 10% by weight of fumaric acid mono-lower alkyl ester on the basis of total monomer mixture and an aromatic diamine compound vulcanizing agent. It is effectively applicable as a vulcanization molding material for seal members or hose members (abstract). Fumaric acid mono-lower alkyl ester-containing acrylic elastomer can be further copolymerized with other vinyl or olefinic monomer (column 3, lines 9-11). The aromatic diamine compound can be used in an amount of about 0.1 to about 5 parts by weight per 100 parts by weight of the fumaric acid mono-lower alkyl ester-containing acrylic elastomer (column 3, lines 52-56). The acrylic elastomer can be further admixed with a reinforcing agent, a filler, an

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antioxidant etc, if necessary (column 4, lines 17-21). Its vulcanization molding can be carried out by compression molding, injection molding, transfer molding etc (column 4, lines 28-29).

The Examiner concedes that "Moriyama et al is silent with respect to thiazole-based compound; amount of thiazole based compound; and the wall thickness of molded-article, such as gasket or o-ring, of not more than 30 mm.

The Examiner has accordingly relied upon Hiramatsu et al. as teaching:

... subjecting elastomer to crosslinking with S or S-containing compounds. The sulfur containing compounds include thiazoles such as mercaptobenzothiazole or dibenzothiazyl disulfide. The crosslinked material obtained has low permanent compressive strain and high heat resistance while maintaining excellent workability and moldability characteristic of S-crosslinked material (abstract).

U.S. Patent No. 6,156,349 to Moriyama et al. corresponds to JP 09-273496.

As the Examiner concedes, Moriyama et al. fails to teach the use of a thiazole-based compound.

The present invention is directed at a manner of improving the compress set characteristics of an amine-vulcanizable carboxylic group-containing acrylic elastomer.

The compression sets are improved by the use of a thiazole-based compound that seems to act as a secondary antioxidant together with an amine-based or phenol-based primary antioxidant.

As discussed in applicants' paragraph [0007], the vulcanization-molded articles obtained by the present invention:

...have distinguished heat resistance and compression set resistance characteristics, and an improved durability, even if they are thin-wall vulcanization-molded articles having a small wall thickness or a small wire diameter such as gaskets, O rings, etc.

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Moriyama et al. discloses an amine-vulcanizable, carboxylic group-containing acrylic elastomer. However in Moriyama et al., the vulcanization is carried out by an aromatic diamine compound vulcanizing agent and a guanidine compound vulcanization aid/promoter.

At column 3, line 64 through column 4, line 16 Moriyama et al. teach:

Guanidine compound for use in the present acrylic elastomer composition includes, besides guanidine, diphenylguanidine, tetramethylguanidine, tetraethylguanidine, di-o-tolylguanidine, 1-o-tolylbiguanide, di-o-tolylguanidine salt of dicatechol borate, etc., among which diphenylguanidine and di-o-tolylguanidine are preferable. The guanidine compound can be used in an amount of about 0.1 to about 10 parts by weight, preferably about 0.3 to about 6 parts by weight, more preferably about 0.5 to about 4 parts by weight, per 100 parts by weight of the fumaric acid mono-lower alkyl ester-containing acrylic elastomer. Below about 0.1 part by weight the vulcanization speed will be retarded and it will take a longer time in the secondary vulcanization, and thus this is not practical, whereas above about 10 parts by weight the vulcanization will be inhibited and no satisfactory compression set characteristics can be obtained. In case other vulcanization promoters than guanidine are used, any satisfactory compression set characteristics can be no more obtained (emphasis added)

Further at column 11, lines 25-27 Moriyama et al. teach:

Compression set characteristics are poor in Comparative Examples 10 to 12 using other compounds than the guanidine compound as a vulcanization promoter,

It thus can be concluded that Moriyama et al. teaches that the use of vulcanization promoters other than a guanidine compound can never improve the compress set characteristics of a amine-vulcanizable carboxylic group-containing acrylic elastomer.

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Hiramatsu et al. discloses that in a cross-linking method that involves sulfur-based cross-linking, physical properties such as compression set characteristics can be effectively improved by conducting secondary vulcanization by means of irradiation with radiation rays. As disclosed in the "Problem to be solved by the Invention" section (English translation attached) which states:

As the result of serious studies on a cross-linking method capable of attaining distinguished physical properties such as compress set, heat resistance, etc. and shortening process steps, while using a sulfur-based cross-linking agent, the present inventors have found that the problem can be effectively solved by conducting the secondary vulcanization by means of irradiation with radiation rays.

The illustrated examples of sulfur-vulcanizable elastomers included in Hiramatsu et al. do not include any carboxylic group-containing acrylic elastomer - rather only an active chlorine-containing rubber is mentioned as an acrylic elastomer.

In Comparative Example 5 and Example 3 of Hiramatsu et al. includes an acrylic rubber and conducts sulfur vulcanization, howbeit no thiazole-based compound is used in these examples. Thus the secondary vulcanization by irradiation with  $\gamma$  rays was required to improve the compression set characteristics.

In comparative Examples 1-2 and Example 1 of Hiramatsu et al. (sulfur cross-linking of hydrogenated acrylonitrile-butadiene rubber (H-NBR)), and in Comparative Examples 3-4 and Example 3 (sulfur cross-linking of ethylene-propylene-diene terpolymer rubber (EPDM)), a mercaptobenzothiazole is used as a vulcanization promoter; however, the elastomers used in these examples did not include acrylic rubber.

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The thiazole-based compounds function as a vulcanization promoter in the sulfur vulcanization systems in Hiramatsu et al.

In contrast, in the present invention, the thiazole-based compounds do not function as vulcanization promoters.

Rather in the present invention, the thiazole-based compounds function as secondary antioxidants in the amine vulcanization system.

As a result, the compression set characteristics are improved according to the present invention.

The results obtained according to the present invention are not at all expected or anticipated or obvious from the teachings of Moriyama et al. and Hiramatsu et al., alone or in combination.

Moreover, even if the teachings of Moriyama et al. and Hiramatsu et al. were combined - Hiramatsu et al.'s use of a thiazole-based compound as a vulcanization promoter in the sulfur cross-linking of H-NBR or EPDM and Moriyama et al.'s teaching of exclusion of other vulcanization promoters than guanidine compounds in the amine vulcanization of carboxylic group-containing acrylic elastomers - the present invention is distinguishable on the basis of rubber species (H-NBR, EPCM or amine-vulcanizable vs. carboxylic group-containing acrylic rubber), vulcanization system (Sulfur vulcanization or amine vulcanization) and compression set characteristic improvements.

As opposed to the teachings of Moriyama et al. and Hiramatsu et al., applicants' invention achieves improvements in compress set characteristics using a thiazole-based compound in the vulcanization of carboxylic group containing acrylic elastomers.

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On pages 3-4 of the Office Action the Examiner argues that it is not necessary for the secondary reference (Hiramatsu et al.) to contain all the limitations of a primary reference. Further the Examiner states that while Hiramatsu's disclosure is not made in the context of carboxyl-functionalized acrylic elastomers, nevertheless since it described at least one embodiment of a functionalized acrylic elastomer and there is no evidence of record to contradict that Hiramatsu's teaching cannot be extended to other functionalized acrylic elastomers, the combination of Moriyama et al. and Hiramatsu et al. is sound and proper.

The Examiner's position ignores the holding in *In re Wesslau*:

*It is impermissible within the framework of Section 103 to pick and choose from any one reference only so much of it as will support a given position to the exclusion of other parts necessary to the full appreciation of what such reference fairly suggests to one of ordinary skill in the art. In re Wesslau, 147 USPQ 391, at 393 CCPA 1965*

In the present situation, as noted above, the use of "functionalized acrylic elastomers" which the Examiner relied upon in Hiramatsu et al. are believed to have been discussed above where it is noted that Hiramatsu et al. teach an active chlorine-containing rubber that is sulfur-vulcanizable or non-acrylic rubbers that are vulcanized with mercaptobenzothiazole.

It is not enough that Hiramatsu et al. might teach "functionalized acrylic elastomers" as the Examiner contends, the context of any such disclosure of "functionalized acrylic elastomers" has to be taken into consideration for purposes of combining the teachings of Hiramatsu et al. with Moriyama et al.

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The teachings of Hiramatsu et al. properly considered as a whole in light of, or in combination with, the teachings of Moriyama et al. do not render obvious applicants' claimed invention nor the improvement in compression set characteristics which applicants alone have discovered.

Based upon the above distinctions between the prior art relied upon by the Examiner and the present invention, and the overall teachings of prior art, properly considered as a whole, it is respectfully submitted that the Examiner cannot rely upon the prior art as required under 35 U.S.C. §103 to establish a prima facie case of obviousness of applicants' claimed invention.

It is, therefore, submitted that any reliance upon prior art would be improper inasmuch as the prior art does not remotely anticipate, teach, suggest or render obvious the present invention.

It is submitted that the claims, as now amended, and the discussion contained herein clearly show that the claimed invention is novel and neither anticipated nor obvious over the teachings of the prior art and the outstanding rejection of the claims should hence be withdrawn.

Therefore, reconsideration and withdrawal of the outstanding rejection of the claims and an early allowance of the claims is believed to be in order.

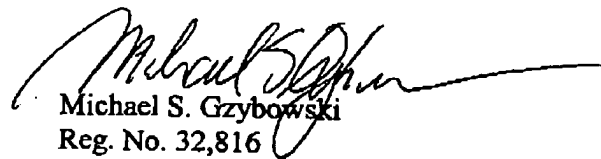
It is believed that the above represents a complete response to the Official Action and reconsideration is requested.

If upon consideration of the above, the Examiner should feel that there remain outstanding issues in the present application that could be resolved, the Examiner is invited to contact applicants' patent counsel at the telephone number given below to discuss such issues.

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To the extent necessary, a petition for an extension of time under 37 CFR §1.136 is hereby made. Please charge the fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account No. 12-2136 and please credit any excess fees to such deposit account.

Respectfully submitted,



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**Partial English translation of JP-A-61-171737****[ Problem to be solved by the Invention ]**

As the result of serious studies on a cross-linking method capable of attaining distinguished physical properties such as compression set, heat resistance, etc. and shortening process steps, while using a sulfur-based cross-linking agent, the present inventors have found that the problem can be effectively solve by conducting the secondary vulcanization by means of irradiation with radiation rays.